disengagement chamber adapted to receive an oil and water mixture and retain it for a sufficient time in a relatively undisturbed state whereby oil in the mixture floats to the top of the mixture resulting in a substantially oil free volume of water having a layer of oil derived from said oil and water mixture floating on the surface thereof, the oil disengagement chamber being partially separated from an effluent water chamber by an under flow baffle which ducts the substantially oil free volume of water to the effluent water chamber, the oil disengagement chamber having a low liquid level which is higher than the under flow baffle, said method comprising the step of installing a flow retarding device in or in association with a weir wall of the decant separator so that a rate of outflow of the substantially oil free volume of water is controlled as a function of the head of the liquid in the effluent water chamber.

61. (Amended) An oil from water separator system as defined in Claim 33, comprising a plurality of oil from water separators each as defined by Claim 33, said plurality of separators connected in series whereby outflow from each preceding separator passes to an inlet of the next succeeding separator.

REMARKS

In the Office Action mailed December 19, 2001 (Paper No. 11), the Examiner cited requirements for an Information Disclosure Statement. In particular, the Examiner noted and construed that references listed in the specification of the application to be the IDS, and thus further noted that such a format does not satisfy the requirements for the IDS. The Applicants note that a separate IDS was filed on December 13, 2001, and assume that the Examiner did not receive it in time prior to mailing of the Office Action on December 19, 2001. To facilitate further examination of the application, a copy the previously filed IDS is enclosed herewith.

In the Office Action, the Examiner rejected Claims 33-35, 38-55, and 58-62 of the above-captioned application in view of various cited references and for other reasons. By this paper, the Applicant has amended some of the claims to distinguish and clarify the invention. Attached to this response is a **VERSION WITH MARKINGS TO SHOW CHANGES MADE** showing the additions and **[deletions]** to the said claim. Hence reconsideration of the above-captioned

application in light of the amendments and remarks contained herein is now respectfully requested.

Rejection under 35 U.S.C. § 112

In the Office Action, the Examiner rejected Claims 39 and 59 under 35 U.S.C. § 112, under second paragraph, as being indefinite. In particular, the Examiner was unclear as to what the Applicants intended by the recitation: "*has a characteristic which is a function of*". The Applicants have amended Claims 39 and 59 such that "*has a characteristic which is a function of*" phrase is replaced with "*is sized with reference to*", so as to clarify the Applicants' intended meaning of Claims 39 and 59.

Rejections under 35 U.S.C. § 102(b) and 103(a)

In the Office Action, the Examiner rejected Claims 33-35, 38-55, and 58-62 under 35 U.S.C. § 102(b), or in the alternative, under 35 U.S.C. § 103(a) as anticipated or obvious over the Hirshstein (U.S. Patent No. 2,284,737) reference. After carefully reviewing the Hirshstein reference, the Applicants note that the cited reference relates to a proposed method for 'separating and recovering grease, oils and fat from waste waters' (page 1a, line 4). Its claims for novelty include:

- (Claim 1) Creation by means of baffles two zones of contained waste water – the first deliberately made turbulent 'to facilitate the separation of the grease' (2a,7) and a second zone 'relatively non-turbulent' (1a,53).
- (Claim 2) Creation by means of baffles the movement of recovered grease, oil or fat towards the draw-off outlet without mechanical devices (4b,10).
- (Claim 3) A separator for separating liquids of different specific gravities (5a,25).
- (Claim 4) An arrangement for
- permitting grease or oil drawoff only when sufficient grease or oil has accumulated (5b,19)

- releasing to the sewer air compressed by accumulation of grease or oil on the water surface (4a,6)
- preventing the backflow of sewer gas, by means of a water seal (4a,15).
- (Claim 5) An arrangement for varying the level for grease or oil draw-off (3b,52).

It is clear that the separator is intended to run 'liquid full', ie. there is no capability for (or intention of) lowering of the operating water level to provide capacity to accumulate and substantially increase the holding (residence) time for inflowing waste water. eg:

- (1b,25)'...discharging waste water can ... flow out of the separator, so long as there is an inflow of waste water to the separator.'
- (1b,30)'...a method of controlling the localized rates of flow and the directions of flow of the incoming waste water in such a manner that a body of water always present in the separator receptacle, is controlled ...'
- (3b,38)'A continuous flow of waste water through the inlet and outlet will cause the normal water level in both zones T and Q to be raised during the period the waste waters are passing through the device ...'
- (4a,25)'In Fig. 5 the apparatus is illustrated to show the relation of the normal water level within the receptacle 10 to the inlet and outlet and to the jet slots ...'
- (4b,14)' the normal static water level within the receptacle 10 can be predetermined fairly definitely, and can be maintained and the lowering of such static normal water level by accumulated grease and fat ... is prevented.'

The apparatus in the Hirshstein reference is a grease trap discharging to a sewer and would not have been intended or expected to produce oil-free effluent water (below the 10 mg/L O&G now required. For gravity separation of oil droplets smaller than 150 microns (the design basis for American Petroleum Industry Separators) the requirements are residence times sufficient for the droplets to rise out of the effluent water flow path and an absence of turbulence. The Hirshstein reference acknowledges the need for a quiescent zone but also attempts to create

an adjacent turbulent zone, perhaps useful for impact coalescence of coarse grease and fats but quite counterproductive for separation of oil to levels below about 100 mg/L.

One aspect of the Hirshstein reference deserves comment to anticipate and dismiss any claim to relevance for the claims of the present application:

- (4b,22)'The intimate location of the plurality of vertically extending baffles relative to the receptacle inlet and to each other, together with the presence at all times of a substantial body of waste water therein, all serve to greatly decrease the velocity of the inflowing waste waters, thus increasing, to a considerable extent, the fat, grease or oil recovery efficiency of the device.'

The 'dimensioning' of the receptacle (separator) is 'dependent upon the flow rate in gallons per hour of the waste water which is to pass therethrough.' (2b,16), in effect, to provide sufficient residence time for separation to take place. A separator with a longer residence time should achieve greater oil separation unless it is full of water from which most of the oil has been separated already. The significant difference with the claims of the present application is that when emptied by its siphon its capacity is available to treat incoming waste water from which the oil has not yet been separated. Substantially longer residence times and thus substantially greater oil separation efficiencies are achievable.

For the foregoing reasons, the Applicant submits that Claims 33-35, 38-55, and 58-62 address a subject matter that is distinct from the Hirshstein reference cited by the Examiner. Therefore, the Applicants respectfully submit that the invention defined by the aforementioned claims is patentable over the Hirshstein reference.

In the Office Action, the Examiner also rejected Claims 40-55 and 58-59 under 35 U.S.C. § 102(b), or in the alternative, under 35 U.S.C. § 103(a) as anticipated or obvious over the Pravicha et al. (U.S. Patent No. 745,519) reference. After carefully reviewing the Pravicha et al. reference, the Applicants note that the cited reference relates to a proposed method for separating fatty substances from water. It comprises a separating tank compartment 8 fed at water surface level with the oil-water mixture, connected to a compartment 7 to which 'oil-free' water flows

through 'tube 6' (page 1, line 75). The 'oil-free' water is delivered to drain through an 'overflow pipe 9' (1,82).

The claims for the Pravicha et al. invention are:

- (Claim 1) 'Means for separating fatty substances from water, comprising'
- receptacle for 'mingled fats and water'
- an oscillatory overflow for drawing off fats
- overflow level adjusting mechanism
- conduit for drawing off water from the bottom of the receptacle as the charge flows in at the top (2,51).
- (Claim 2) 'A tank for separating fatty substances from water, comprising'
- a plurality of compartments
- conduits leading the water from each preceding compartment into the next succeeding
- an oscillatory overflow for the separated fats
- means for holding said overflow to minimise rocking (for use on steamers).

This separator is clearly intended to run 'liquid full', ie. there is no capability for (or intention of) lowering of the operating water level to provide capacity to accumulate and substantially increase the holding (residence) time for inflowing oil-water mixtures, eg:

- (Fig.1) The oil separation compartment 8 clearly must remain full of water as the deliberately designed and only water exit is via tube 6 which is intended to deliver 'oil-free' water to compartment 7; as tube 6 clearly has no downleg the water level in compartment 8 cannot fall below the exit level of tube 6.
- (1,99) 'These (collecting) tanks will separate the liquids (oil, water, and fatty matters), gathering to one side the oils, while at the same time allowing the water to continue its course (into the drain).'

Thus this invention does not address the invention of the present application as claimed which claims the concept of lowering (by means of a siphon) the operating water level to provide

capacity to store incoming oil-water mixture and thus beneficially and substantially increase the time available for oil-water separation.

For the foregoing reasons, the Applicant submits that Claims 40-55 and 58-59 address a subject matter that is distinct from the Pravicha et al. reference cited by the Examiner. Therefore, the Applicants respectfully submit that the invention defined by the aforementioned claims is patentable over the Pravicha et al. reference.

SUMMARY

For the foregoing reasons, the Applicant submits that all of the claims of the pending application are allowable over the art of record. Should there be any impediment to the prompt allowance of this application that could be resolved by a telephone conference, the Examiner is respectfully requested to call the undersigned at the number shown.

Please charge any additional fees, including any fees for additional extension of time, or credit overpayment to Deposit Account No. 11-1410.

Respectfully submitted,
KNOBBE, MARTENS, OLSON & BEAR, LLP

Dated: 8/18/02

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VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE CLAIMS:

Claims have been amended as follows:

33. (Amended) An oil from water separator including an oil disengagement chamber adapted to receive an oil and water mixture and retain it for a sufficient time in a relatively undisturbed state whereby oil in the mixture floats to the top of the mixture resulting in a substantially oil free volume of water having a layer of oil derived from said oil and water mixture floating on the surface thereof, said oil disengagement chamber partially separated from an effluent water chamber by an under flow baffle which ducts said substantially oil free volume of water to said effluent water chamber, the oil disengagement chamber having a low liquid level which is higher than the under flow baffle, the outflow of said substantially oil free volume of water from said effluent water chamber being limited by flow retarding means to a rate of outflow which is a function of the head of the liquid in said effluent water chamber**[.]**; such that, during operation, the level of said oil and water mixture will rise from a chamber low liquid level up to a higher liquid level and then return to said chamber low liquid level, thereby defining an oil and water mixture active lag capacity in said oil disengagement chamber, such that, for a predefined range of inflows into said oil disengagement chamber, outflow from said effluent water chamber will contain a proportion of oil in water substantially below a predefined limit.

34. (Amended) The separator of Claim 33, wherein said flow retarding means is operable to accumulate said oil and water mixture in said oil disengagement chamber in an oil and water mixture accumulation volume above **[the]** said chamber low liquid level.

38. (Amended) The separator of Claim 33, wherein said flow retarding means is sized with reference to expected inflow of said oil and water mixture into said oil disengagement chamber such that, during operation, the level of said oil and water mixture will rise from said chamber low liquid level and then return to said chamber low liquid level, thereby defining **[an]** said oil and water mixture accumulation volume above said chamber low liquid level.

39. (Amended) The separator of Claim 38, wherein said accumulation volume **[has a characteristic which is a function of]** is sized with reference to

(a) inflow rate; and

(b) desired residence time of said oil and water mixture in said oil disengagement chamber.

40. (Amended) An oil from water separation system including an oil disengagement chamber having **[a flush storage]** an accumulation volume defined between a chamber high liquid level and a chamber low liquid level; said **[flush storage]** accumulation volume caused to exit from said chamber on attainment of said chamber high liquid level**[.]**; such that, during operation, the level of said oil and water mixture will rise from said chamber low liquid level up to said chamber high liquid level and then return to said chamber low liquid level, thereby defining an oil and water mixture active lag capacity in said oil disengagement chamber between said chamber high liquid level and said chamber low liquid level, such that, for a predefined range of inflows into said oil disengagement chamber, outflow from said system will contain a proportion of oil in water substantially below a predefined limit.

42. (Amended) An oil from water separator including an oil disengagement chamber adapted to receive an oil and water mixture and retain it for a sufficient time in a relatively undisturbed state whereby oil in the mixture floats to the top of the mixture resulting in a substantially oil free volume of water having a layer of oil derived from said oil and water mixture floating on the surface thereof, and means for retarding outflow from said chamber until said mixture reaches a predetermined chamber high liquid level whereupon said substantially oil free volume of water is caused to exit said chamber**[.]**; such that, during operation, the level of said oil and water mixture will rise from said chamber low liquid level up to a higher liquid level and then return to said chamber low liquid level thereby defining an oil and water mixture active lag capacity in said oil disengagement chamber, such that, for a predefined range of inflows into said oil disengagement chamber, outflow from said separator will contain a proportion of oil in water substantially below a predefined limit.

48. (Amended) The separator of Claim 42, wherein, on reaching said chamber high liquid level, outflow is initiated and maintained until a predetermined **[chamber]** low liquid level in said chamber is reached at which time outflow is terminated by said means for retarding outflow.

51. (Amended) The separator of Claim 42, wherein said means for retarding outflow comprises a retention wall having at least one aperture at a predetermined level passing therethrough, said at least one aperture adapted to regulate flow of water from said disengagement chamber when said mixture **[reaches]** is above said predetermined chamber high liquid level.

52. (Amended) An oil from water separator including an oil disengagement chamber adapted to receive an oil and water mixture and retain it for an extended time in a relatively undisturbed state whereby oil in the mixture floats to the top of the mixture resulting in a substantially oil free volume of water having a layer of oil derived from said oil and water mixture floating on the surface thereof, outflow from said chamber being controlled in a predetermined way by flow retarding means**[.]**; such that, during operation, the level of said oil and water mixture will rise from said chamber low liquid level up to a higher liquid level and then return to said chamber low liquid level thereby defining an oil and water mixture active lag capacity in said oil disengagement chamber, such that, for a predefined range of inflows into said oil disengagement chamber, outflow from said separator will contain a proportion of oil in water substantially below a predefined limit.

53. (Amended) An oil from water separator including an oil disengagement chamber adapted to receive an **[oil/water]** oil and water mixture and retain it for a sufficient time in a relatively undisturbed state whereby oil in the mixture floats to the top of the mixture resulting in a substantially oil free volume of water having a layer of oil derived from said oil and water mixture floating on the surface thereof, wherein outflow from said chamber is limited by flow retarding means to a predetermined function of the level of said oil and water mixture in said chamber**[.]**; said oil disengagement chamber is partially separated from an effluent water chamber by an under flow baffle which ducts said substantially oil free volume of water to said effluent water chamber.

54. (Amended) The separator of Claim 53, wherein said flow retarding means is operable only between **[a]** said chamber low liquid level and a chamber high liquid level.

58. (Amended) The separator of Claim 53, wherein said flow retarding means is sized with reference to expected inflow of said oil and water mixture into said oil disengagement

chamber such that, during operation, the level of said oil and water mixture will rise from said chamber low liquid level up to a higher liquid level and then return to said chamber low liquid level, thereby defining for each situation an oil and water mixture active lag capacity between said higher liquid level and said chamber **[high]** low liquid level.

59. (Amended) The separator of Claim 58, wherein said active lag capacity **[has a characteristic which is a function of:]** is sized with reference to:

(a) inflow rate; and

(b) desired residence time of said oil and water mixture in said oil disengagement chamber.

60. (Amended) A method of conversion of a **[decant]** conversion of an oil from water separator which normally operates liquid full into an oil from water separator which has an oil disengagement chamber adapted to receive an oil and water mixture and retain it for a sufficient time in a relatively undisturbed state whereby oil in the mixture floats to the top of the mixture resulting in a substantially oil free volume of water having a layer of oil derived from said oil and water mixture floating on the surface thereof, the oil disengagement chamber being partially separated from an effluent water chamber by an under flow baffle which ducts the substantially oil free volume of water to the effluent water chamber, the oil disengagement chamber having a low liquid level which is higher than the under flow baffle, said method comprising the step of installing a flow retarding device in or in association with a weir wall of the decant separator so that a rate of outflow of the substantially oil free volume of water is controlled as a function of the head of the liquid in the effluent water chamber.

61. (Amended) An oil from water separator system as defined in Claim 33, comprising a **[first and second]** plurality of oil from water separators each as defined by Claim 33, said plurality of separators connected in series whereby outflow from **[a first]** each preceding separator passes to an inlet of **[a second]** the next succeeding separator.